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THE GENUS EUPOMOTIS.

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The genus *Eupomotis* differs from *Lepomis* only in the blunter and more pavement-like teeth of the lower pharyngeal bones. These bones are usually broader and more concave in *Eupomotis* than in *Lepomis*; the gill rakers are usually shorter and less numerous, and the supplemental maxillary is much reduced or wanting, and the opercular flap is always provided with an orange spot on its lower posterior border. The genus *Xystroplites* comprise the species of *Eupomotis* with the larger mouth and the better developed supplemental bone and the longer, harder and more numerous gill rakers.

A careful study of most of the species of this group, representing a number of localities from Arkansas to Iowa, Ontario and Florida, has led me to accept a slightly different arrangement from that adopted by Jordan and Evermann, and so I add here a preliminary revision of the entire group.

KEY TO THE SPECIES OF EUPOMOTIS.

a. Pectoral fin short, not longer than the head, its tips not reaching past anal spines. (*Xystroplites*.)

b. Mouth large, maxillary reaching to or to nearly vertical from front of pupil; supplemental maxillary present; gill rakers hard and of moderate length.

c. Dorsal spines moderate, longest (5th) equals length of snout and half of the diameter of orbit, depth, $2\frac{1}{3}$; body with 8 or 9 dusky bars. *pallidus*.

cc. Dorsal spines shorter, longest (5th) equals length of snout and less than third of the orbit; depth, 2; body without dusky bars; cheeks with blue stripes; pectorals $1\frac{2}{5}$ in head. *eurycus*.

bb. Mouth smaller, maxillary scarcely reaching vertical from front of orbit; supplementary maxillary absent or reduced to a slight rudiment; gill rakers very short and soft. (*Eupomotis*.)

d. Pectoral fin slender, nearly as long as head; its tip reaching to but not past anal spines, scales on the cheeks in 4 or 5 rows. *holbrookii*.

dd. Pectoral fin obtuse, decidedly shorter than the head, tips not or scarcely reaching first anal spine; scales on cheeks in 4 or 5 rows; depth, 2 to $2\frac{1}{2}$. *gibbosus*.

aa. Pectoral fins long, slender and pointed, longer than the head; tips reaching to or past middle of anal fin.

e. Gill rakers long, their ends obtuse; scales 7-44-15.

longimanus.

ee. Gill rakers short as in *gibbosus*; scales 7-39-14. *heros*.

1. *Eupomotis pallidus* (Agassiz).

Pomotis pallidus, Agassiz, Amer. Jour. Sci. Arts, 1854, 303 Tennessee River, Huntsville, Alabama.

Eupomotis pallidus, Jordan & Evermann, Bull. 47, 1896, 1006.

Lepomis lirus, McKay, Proc. U. S. Nat. Museum, 1881, 89 (after *Pomotis pallidus* Ag.).

Xystroplites gilli, Jordan, Bull. X, U. S. Nat. Mus., 1877, 24, Garden Key, Florida?

Bryttus albulus, Girard, has been regarded by Dr. Jordan, Dr. Evermann, Mr. Bollman and Mr. McKay as belonging to the genus *Eupomotis*. In their work on Fishes of North and Middle

America, Jordan and Evermann considered it as identical with *Eupomotis pallidus* Agassiz. At my request Mr. B. A. Bean kindly compared the type of *Bryttus albulus* with specimens of *Apomotis cyanellus* Raf., and he informs me that both are the same species.

2. *Eupomotis euryorus* (McKay).

Lepomis euryorus, McKay, Proc. U. S. Nat. Mus., 1881, 89. Fort Gratiot, Michigan. Jordan & Gilbert Synopsis, 1883, 481.

Eupomotis euryorus, Jordan & Evermann, Bull. 47, U. S. Nat. Mus., 1896, 1008.

Lepomis holbrooki, Meek, Bull. U. S. Fish Comm., 1890, 229. Amana, Iowa. Meek. l. c. 235, Cedar River, Cedar Rapids and West Liberty, Iowa.

Lepomis auritus, Boulenger, Cat. 1, 1895, 24 (in part). Habitat—Iowa to Michigan.

3. *Eupomotis holbrooki* (Cuvier & Valenciennes).

Pomotis holbrooki, C. & V. Hist. Nat. Poiss. vii, 466, 1831, Charleston, S. C.

Pomotus speciosus, Holbrook, Jour. Acad. Nat. Sci., Phila., 1855, 48, pl. 5, fig. 2, St. John's River, Florida.

Pomotis microlophus, Gunther, Cat. 1, 264.

Lepomis holbrooki, Jordan & Gilbert, Syn., 482, 1833. Bollman Rept. U. S. Fish. Com. 1888 (1892), 576.

Eupomotis holbrooki, Boulenger Cat., 1, 1895, 31. Jordan & Evermann Bull. 47, U. S. Nat. Mus., 1896, 1008. Habitat—Virginia to Florida.

4. *Eupomotis gibbosus* (Linnæus).

Perca gibbosa, Linnæus Syst. Nat. Ed. x, 1758, 292, Carolina: after *Perca fluviatilis gibbosa*, ventre lutea Catesby.

Sparus aureus, Walbaum, Artedi, Pisc., 1792. Lakes of New York: after "Goldfisch" of Schöpf.

Morone maculata, Mitchill, Fishes of New York, 18, 1814, near New York City.

Pomotis vulgaris, C. & V. Hist. Nat. Poiss. iii, 91, 1829. Lake Huron, New York, Virginia and California.

Pomotis ravenelii C. & V. L. c. vii, 465, 1831, Philadelphia.

Pomotis catesbii, C. & V. L. c. vii, 469, 1831, Philadelphia.

Lepomis euryorus, Kirsch, Bull. U. S. Fish. Comm., 1894, 38. Cedar and Shriner Lakes, and Eel River, Indiana.

Eupomotis aureus, Boulenger Cat., 1896, 32.

Eupomotis gibbosus, Jordan & Evermann, Bull. 47, U. S. Fish. Comm., 1896, 1009.

Lepomis gibbosus of authors generally.

Habitat—Great Lake Region and northern part of the Mississippi Valley to Maine, and southward east of the Alleghanies to Florida.

Eupomotis gibbosus has a very wide range and is subject to considerable variations. Blue stripes and blue markings on the side are very prominent on specimens from Hicksville, Ohio, and Marion, Iowa. Specimens from Winona Lake have seven or eight faint dark bars on sides, and no blue stripes on the cheeks. Three specimens from Whiting, Indiana, have well defined bars, two have distinct bars, none have stripes on the cheeks. Some of these specimens are deeper than the others. The specimens from Gull Lake, Ontario, are more slender than any I have seen. There are no blue stripes on the cheeks and the bars on side are very prominent on some specimens and none on others. In none of the specimens of this genus which I have examined does the pectoral fin reach as far as to the second anal spine. It seldom reaches to the vent.

5. *Eupomotis longimanus* (Cope).

? *Pomotus notatus*, Agassiz, Am. Jour. Sci. and Arts, 1854, 302. Huntsville, Alabama.

? *Lepomis notatus*, McKay, Proc. U. S. Nat. Mus., 1881, 92. Huntsville, Alabama.

Xystroplites longimanus, Cope, Proc. Amer. Phil. Soc., 1877, 66. Volusia and Port Bay, Florida.

Habitat—Florida to Alabama.

Eupomotis longimanus, Cope, is described as having longer gill rakers and smaller scales than *Lepomis heros*, Baird & Girard. The description of *Pomotus notatus* Ag. is insufficient for positive identification. McKay examined some of Agassiz' types and identified them as *Eupomotis pallidus*, Gill & Jordan = *Pomotus pallidus* Ag. The long pointed pectoral fin and the "fewer dotted or broken dark lines" on the soft dorsal indicate its close relation with *heros* or *longimanus* if it be not the latter. It is certainly not *Eupomotis pallidus* (Ag.), which is especially characterized by its short pectoral fins.

6. *Eupomotis heros* (Baird & Girard).

Pomotus heros, Baird & Girard, Proc. Acad. Nat. Sci. Phila., 1854, 25. Rio Cibolo, Texas. Girard Pac. R. R. Sur. x, pt. 4,

24, pl. lx, fig. 13-16, 1858. Rio Cibolo, Texas; Rio Neuces, Texas. Dry Creek near Victoria, Texas. River San Juan, and near Cadereita, New Leon River, Blanco, Texas; Fort Bliss, New Mexico. Girard l. c. pt. 5, 49, Rio Blanco, Texas. Girard, Mex. Bd. Sur. 6, pl. 2, figs. 1-4. Rio Cibolo, Texas, Dry Creek near Victoria, Texas; Rio San Juan and near Cadereita, New Leon.

Lepomis heros McKay, Proc. U. S. Nat. Mus. 1881, 89; Jordan & Gilbert, Synopsis, 1882, 480; Bollman, Rept. U. S. Fish Comm. 1888, (1892), 575; Evermann & Kendall, Bull U. S. Fish Comm, 1892, 112, San Jacinto River, Lynchburg, Texas; Kirsch. Bull. U. S. Fish Comm. 1894, 39; Round Lake, Indiana (doubtful identification).

Eupomotis heros, Boulenger Cat. 1, 1895, 32; Jordan & Evermann, Bull. 47, U. S. Nat. Mus. 1896, 1007.

Lepomis macrochirus Meek. Bull. U. S. Fish Comm., 1890, 235, Cedar River, Waverly, Iowa; Dumont, Iowa. Meek. l. c. 1894, 79. White River; Spring, Salado and Caney Creeks, Batesville, Arkansas. Black River, Black Rock, Arkansas. Meek. l. c. 1894, 83, Devil's Fork Little Red River, Kinderhook, Arkansas (not *L. macrochirus* Meek, page 87, which is a form of *L. megalotis*). Meek. Bull. U. S. Fish Comm. 1896, 343, Poteau River at Poteau, Indian Territory, and Fort Smith, Arkansas.

Habitat: Indiana to Texas and Rio Grande.

In my former papers I identified this species with *L. macrochirus* Raf. The pharangeals are not so broad nor the teeth so paved as in *E. gibbosus*. This fact, and the absence of the scarlet opercular spot in first examples taken, led me to identify this species with *L. macrochirus*. I am in doubt as to whether or not it is identical with *E. heros* (B. & G.), as the types of this species were taken in Texas, where, in many respects, the fish fauna is different from that of the St. Francis Basin and Southern Missouri.

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